## REMARKS

The present Amendment amends claims 1-12 and adds new claims 13-18. Therefore, the present application has pending claims 1-18.

The Abstract of the disclosure stands objected to due to informalities noted by the Examiner in paragraph 1 of the Office Action. Various amendments were made to the Abstract to correct the informalities noted by the Examiner. Therefore, this objection is overcome and should be withdrawn.

Applicants acknowledge the Examiner's indication in paragraph 6 of the Office Action that claims 3-6, 9 and 10 would be allowable if rewritten in independent form including all the limitations of the base claims and any intervening claims. Amendments were made to claim 3-6, 9 and 10 to place them in independent form including all the limitations of the base claim and any intervening claims. Therefore, claims 3-6, 9 and 10 are allowable as indicated by the Examiner.

Claims 1, 2 and 11 stand rejected under 35 USC §102(b) as being anticipated by Seki (U.S. Patent No. 5,771,224); and claims 7, 8 and 12 stand rejected under 35 USC §103(a) as being unpatentable over Seki in view of Nakamura (U.S. Patent No. 5,107,504). These rejections are traversed for the following reasons. Applicants submit that the features of the present invention as now more clearly recited in claims 1, 2, 7, 8, 11 and 12 are not taught or suggested by Seki or Nakamura whether taken individually or in combination with each other as suggested by the Examiner. Accordingly, reconsideration and withdrawal of these rejections is respectfully requested.

The present invention is directed to a transmission apparatus, of orthogonal frequency division multiplexing for multiplexing a plurality of carriers orthogonal to one another for transmitting signals having a frequency band, including a transmission side and a reception side. According to the present invention, the transmission side includes, for example, an input terminal to which the signals are applied, a first modulator coupled to the input terminal for outputting first signals which are main information code signals modulated in accordance with a first modulation scheme, a second modulator for outputting second signals which are auxiliary signals modulated in accordance with a second modulation scheme, and a transmission unit including a distributing circuit coupled with the first and second modulators.

Unique according to the present invention is that the distributing circuit distributes the first and second signals modulated by the first and second modulators to a plurality of predetermined carriers, respectively, so that the second signals are arranged at the positions of all or some of the carriers existing within a limited number of carriers close to at least one of both ends of the transmission band, and the first signals are arranged at the positions of all or some of the remaining carriers other than the limited number of carriers of said transmission band, and outputting the modulated signals.

Referring to the embodiment of the present invention as shown in Figs. 1 and 2 of the present application, a carrier represented by a symbol "□" with the reference letter D denoted therein will be called a "D-carrier", while a carrier represented by a symbol "□" shown as blank without any letter denoted therein will be called a "C-

carrier". The SP carriers, represented by a symbol "□" with the reference letters SP denoted therein, are not the information code signals, but pilot signals used as reference signals for correctly demodulating the information codes at the receiver.

The transmission apparatus of this embodiment of the present invention is configured to modulate information codes (the second signals) assigned to the D-carriers in both end regions of the transmission band in accordance with a differential modulation scheme which does not require reference signal vectors for demodulation such as DBPSK (Differential Binary Phase Shift Keying), DQPSK (Differential Quadrature Phase Shift Keying), 8DPSK or 16 DAPSK (Differential Amplitude Phase Shift Keying) scheme, rather than the synchronous modulation scheme such as the 64QAM scheme. Since the differential modulation scheme does not use pilot signals for demodulation, information codes are not affected by distortions in reference signal vectors. On the other hand, information codes (the first signals) are assigned to the C-carriers in accordance with a synchronous modulation scheme such as the 64QAM scheme to reproduce reference signal vectors for use in demodulation of carriers of the synchronous modulation scheme through the interpolation as is the case with Figs. 12 and 13. In carrier mapping for the embodiment of the present invention as per Fig. 1, carriers close to the lower and upper ends of the transmission frequency band, where distortions are particularly larger (peak distortion points) in a characteristic diagram of Fig. 15, are removed from carrier positions modulated by the synchronous modulation scheme. Instead, D-carriers modulated by the differential modulation scheme are assigned. As shown

in Fig. 15, since the SP carriers adjacent to SPa and SPb carriers have small distortions, these carriers still remain as C-carrier.

As a result, this embodiment of the present invention can reduce a code error rate of information codes decoded from carriers modulated in accordance with the synchronous modulation scheme. The information codes (the second signals) to be transmitted by the D-carriers may be part of information codes (the first signals) to be transmitted by C-carriers, for example, some codes such as compressed image codes. Alternatively, other information codes independent of the information codes transmitted by the C-carriers, may be transmitted by the D-carriers, such as an audio signal and a signal for controlling a pan head of a camera. In an extreme case, no information code may be transmitted by the D-carriers. See the description in page 22, line 16 to page 26, line 13 and page 30, line 23 to page 31, line 8 of the original specification and Figs. 1-5.

That is, according to the present invention, the second signals (the auxiliary signals) are arranged on the limited number of carriers (D-carriers) close to the lower and/or upper end of the transmission frequency band, and the first signals (the main information data codes) are arranged on the remaining carriers (the middle part of the band).

The above described features of the present invention as recited in the claims are not taught or suggested by any of the references of record whether taken individually or in combination with each other. Particularly, the above described features of the present invention are not taught or suggested by Seki or Nakamura.

Seki shows, in FIG. 2 thereof, that the QPSK information symbols which are regularly spaced in frequency and time regions are placed among the multi-valued QAM information symbols. That is as per Seki, the OPSK symbols are uniformly arranged in the frequency and time regions, and the OAM symbols are also uniformly arranged in the frequency and time regions. Seki et al does not teach that one (QPSK) of the two different kind symbols are arranged on the limited number of carriers close to the lower and/or upper end of the transmission frequency band, and the other symbols are arranged on the remaining carriers as in the present invention as recited in the claims.

Furthermore, the QPSK information symbols of Seki do not correspond to the second signals (auxiliary signals) of the present invention as recited in the claims. As stated in column 7, line 64 to column 8, line 8 of Seki "the QSPK information symbols are constant in amplitude and represent four phases at intervals of $90^0$. If, therefore, a variation in phase of a received signal is within +-$45^0$ in the interval at which the QPSK information symbols are transmitted, it will be possible to detect variations in amplitude and phase. For time slots and frequency slots in which no QPSK information symbol is transmitted, the detected variations in amplitude and phase of QPSK information symbols are interpolated with respect to time and frequency". That is, the QSPK information symbols are the reference signals the same as the pilot signals (SP) used for correctly demodulating the information codes at the receiver.

The information codes (the first signals) assigned to the C-carriers in 64QAM according to the embodiment of the present invention as recited in the claims is a main information signal. See page 30, line 27 of the present application. The second

signals of the present invention as recited in the claims is the signals modulated with the auxiliary signals such as the TMCC signal and AC signal. See page 31, line 1 of the present application.

Thus, Seki does not teach or suggest that the auxiliary signals are arranged on the limited number of carriers close to the lower and/or upper end of the transmission frequency band as recited in the claims.

Further, Seki does not teach or suggest the distributing circuit which distributes the first and second signals modulated by the first and second modulators to a plurality of predetermined carriers, respectively, so that said second signals are arranged at the positions of all or some of said carriers existing within a limited number of carriers close to at least one of both ends of said transmission band, and said first signals are arranged at the positions of ail or some of the remaining carriers other than said limited number of carriers of said transmission band, and outputting the modulated signals as recited in the claims.

Therefore, as is clear from the above, Seki fails to teach or suggest the features of the present invention as recited in claims 1, 2 and 11. Accordingly, reconsideration and withdrawal of the 35 USC §102(b) rejection of claims 1, 2 and 11 as being anticipated by Seki is respectfully requested.

The above noted deficiencies of Seki are not supplied by any of the other references of record particularly Nakamura. Thus, Applicants submit that the features of the present invention as now more clearly recited in the claims are not taught or suggested by Seki whether taken individually or in combination with Nakamura.

Nakamura shows the first error correcting code producing unit 21 and the second error correcting code producing unit 22. These features as taught by Nakamura do not supply any of the deficiencies noted above with respect to Seki. Particularly, Nakamura does not teach or suggest the above described features of the present invention regarding the arrangement of the auxiliary signals and the distributing circuit as recited in the claims.

Thus, Nakamura fails to teach or suggest that the auxiliary signals are arranged on the limited number of carriers close to the lower and/or upper end of the transmission frequency band as recited in the claims.

Further, Nakamura does not teach or suggest the distributing circuit which distributes the first and second signals modulated by the first and second modulators to a plurality of predetermined carriers, respectively, so that said second signals are arranged at the positions of all or some of said carriers existing within a limited number of carriers close to at least one of both ends of said transmission band, and said first signals are arranged at the positions of all or some of the remaining carriers other than said limited number of carriers of said transmission band, and outputting the modulated signals as recited in the claims.

Therefore, as is clear from the above, Seki taken in combination with Nakamura fails to teach or suggest the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 USC §103(a) rejection of claims 7, 8 and 12 as being unpatentable over Seki in view of Nakamura is respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references utilized in the rejection of claims 1, 2, 7, 8, 11 and 12.

As indicated above, the present Amendment adds new claims 13-18. New claims 13-18 recites features similar to that recited in the claims. Therefore, the same arguments presented above with respect to the claims apply as well to new claims 13-18.

In view of the foregoing amendments and remarks, applicants submit that claims 1-18 are in condition for allowance. Accordingly, early allowance of claims 1-18 is respectfully requested.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417 (500.40273X00).

Respectfully submitted,

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